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Article

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MANAGEMENT | RESEARCH ARTICLE

Service system innovation and firm competitiveness in an emerging market: The role of corporate governance system

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Abstract: The study empirically examined the effect of service system innovation on firm competitiveness in Nigeria, an emerging market, focusing on the country's telecommunication sector. Additionally, the moderating effect of the corporate governance system on service system innovation—firm competitiveness nexus was observed. Data were collected using a survey instrument from 230 respondents. The study followed a cross-sectional research design while the study hypotheses were tested using the partial least square—structural equation model (PLS-SEM). Analyses revealed that service system innovation as represented by idea development, service development, and commercialization enhance firm competitiveness. Implying that idea development, service development, and commercialization are essential for higher levels of firm competitiveness. In addition, corporate

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governance system was found to boost the relationship between service system innovation and firm competitiveness. The study offers new understanding into the role of service system innovation in competitiveness of the telecommunication firms especially in developing economies such as Nigeria. The study also shows that the corporate governance system contributes significantly to the success of telecommunication firms. Further, the study provides evidence on the characteristics of service system innovation, corporate governance system, and firm competitiveness within the telecommunication industry. In addition, the study developed and validated an instrument for measuring service system innovation, firm competitiveness, and corporate governance system within a developing economy which may be adopted by future studies when examining these variables. Furthermore, the study confirms the usefulness of dynamic capabilities theory in understanding service system innovation, firm competitiveness, and corporate governance.

Subjects: Innovation Management; Corporate Governance; Organizational Studies; Strategic Management

Keywords: Service system innovation; idea development; service development; commercialization; organizational competitiveness; and corporate governance system

JEL Classification: O31; G34; L96

1. Introduction

In today's chaotic business environment, service system innovation is attracting enormous attention among management scholars and managers of service firms, especially managers of telecommunication firms since they are confronted with intense pressures from several stakeholders including mobile line subscribers, industrial clients, financial institutions, government institutions, competitors, and regulators (Anyebe & Zubairu, 2019; Perano et al., 2018). Service system innovation is important to mobile telecommunication firms because it helps the firms to manoeuvre their ways and be resilient despite the pressures from the environment (Weerawardena & McColl-Kennedy, 2002; Ying et al., 2019).

The relationship between innovation and competitiveness has been explored by several scholars (Akhuand & Abbas, 2021; Alter, 2008; Clark & Guy, 1998; Gu, 2022; Javaid & Afridi, 2015; Jegede et al., 2012). Specifically, Jegede et al. (2012) did a study on innovation and competitiveness among local oil and gas services firms in Nigeria and found a statistically significant relationship between the variables while Akhuand and Abbas (2021) focused on the determinants of international competitiveness in Pakistan. Again, Javaid and Afridi (2015) explored factors contributing to competitiveness but at the national level. Despite the numerous studies on innovation and competitiveness, there seems to be limited studies on innovation and competitiveness at the organisational level since most of the studies focused on competitiveness at the national or international levels (e.g., Akhuand & Abbas, 2021; Jegede et al., 2012). Besides, in terms of composition, innovation is frequently measured with product/service, process, market, and administrative innovation (Wang & Ahmed, 2004), whereas this study sees innovation through systems and service perspectives, hence, service system was added to the construct making it service system innovation (SSI) and measured with idea development, service development, and commercialization in line with Mahmood et al. (2014).

Although some progress has been made in exploring the relationship between service system innovation and firm competitiveness (Efendi et al., 2020; Kiveu et al., 2019; Noorani, 2014), there is limited empirical evidences on the influence of corporate governance system as a moderator between service system innovation and firm competitiveness despite corporate governance

being recognised as a booster of service system innovation (Hove-Sibanda et al., 2017) and affirmed to contribute significantly to firm competitiveness (Nginyo et al., 2018). Peteraf (2016) asserts that corporate governance not only fosters competitive advantage, it also promotes a sense that a firm is being properly managed. Although corporate governance has been adopted as a moderator between organizational variables such as social capital and competitiveness (Ou et al., 2015); available slack and community-based firm performance (Harrison & Coombs, 2012); organizational resources and performance (Wanyama, 2020); and product market competition and firm performance (T. X. Ha & Tran, 2022). There is a dearth of empirical studies on the moderating role of corporate governance systems in the relationship between service system innovation and firm competitiveness. Although corporate governance system is seen as a strong internal mechanism that drives systematic changes within firms (Akbar et al., 2016), moreover, when service system innovation is supported by an effective corporate governance system, there is higher chances of an enhanced firm competitiveness (de Almeida & Dalmácio, 2015). Asensio-López et al. (2019) asserted that corporate governance influences firm's ownership structure and board of director performance, which have an impact on innovation initiatives and results. The aforementioned justification demonstrates that more study is required to fully understand how the corporate governance system influences the relationship between service system innovation and firm competitiveness, especially in the setting of developing nations and in the highly competitive and dynamic telecommunications industry. This study recognises these short-comings in extant literature and addresses them by empirically exploring the moderating role of corporate governance system on service system and firm competitiveness. Hence, the purpose of this study was to empirically examine the effect of service system innovation (idea development, service development, and commercialization) on firm competitiveness as well as ascertain the moderating effect of corporate governance system on the service system innovation and firm competitiveness relationship. The remainder of the study is divided into the following sections: Section two makes an attempt to review baseline theories and related literature as well as formulate testable hypotheses; Section three presents the methodology that was followed in this study; Section four presents and discusses the empirical findings; and Section five concludes the study.

2. Theoretical and hypotheses development

This study derives its theoretical strength from the dynamic capabilities theory (DCT). The DCT was propounded by Teece et al. (1997) and comes from the resource-based view approach. The DCT has been used to explain innovation, service innovation, competitiveness among other organisational variables such as organisational resilience, business growth, firm success, export performance, and organisational performance (Akpan, Johnny, et al., 2022; Sylva & Ojibo, 2018; Efrat et al., 2018; Žitkienė et al., 2015). The DC theory proposed that a firm achieves competitive advantage by utilizing its dynamic capabilities (Teece et al., 1997). Akpan, Al-Faryan, et al. (2022) assert that dynamic capabilities help firms to develop valuable, rare, inimitable, and non-substitutable assets resulting in superior performance and competitive edge. Further, the dynamic capabilities perspective reflects the ability of a firm to achieve new styles of competitive advantage by invigorating competences, structure, and resources to realize harmony with the ever-changing business setting (Coelho et al., 2022).

Based on the dynamic capabilities perspectives, a resource gives a competitive advantage when competing firms do not easily gain access to the resource or possess close substitutes. Therefore, telecommunication firms can rely on the dynamic capabilities theory to enhance service innovativeness and competitiveness since the ability to innovate provides firms competitive advantage (Akpan, Al-Faryan, et al., 2022). Additionally, researchers have suggested that in order for a company to be competitive in the market, it must have certain capabilities and practice continuous learning, particularly in new or changing market environments (Altintas et al., 2022; Samsudin & Ismail, 2019) which is from dynamic capabilities point of view especially in the new or changing market environment (Wilden et al., 2013). The company may not be able to retain its competitive edge due to a lack of dynamic capabilities, especially given the changing environment (Akpan, Al-Faryan, et al., 2022). However, some academics have questioned whether dynamic capabilities directly affect a company's ability to compete. Eisenhardt and Martin (2000), for

instance, contend that while dynamic skills alone do not ensure a firm's competitive advantage, they do generate a more skilful arrangement and placement of the firm's resources than competitors. Despite these opposing views, the DCT still remains among the most widely used theory when discussing innovation and competitiveness.

2.1. Service System Innovation (SSI)

Services are acts performed by one entity for another, including the provision of resources that another entity will use (Lovelock et al., 2016; Paulo et al., 2019). Services are rendered every day and are of various types. Examples of services include: telecommunications, internet services, getting a haircut from the barber, medical checks; laundry; libraries and cafeterias, counselling, photocopying, banking, insurance (Lovelock et al., 2016), while a service system is a work system that produces services (Yang et al., 2019). Alter (2008) defines a work system as a system in which human participants and/or machines perform work using information, technology, and other resources to produce products and services for internal or external customers.

A service system is a dynamic value co-creation configuration of resources, including people, organizations, shared information (language, laws, measures, and methods), and technology, all connected internally and externally to other service systems by value propositions (Badinelli et al., 2012). Every service system has a unique identity and is an instance of a type or class of service systems (e.g., people, businesses, and government agencies). The history of a service system is a sequence of interaction episodes with other service systems, including interaction episodes with itself (Lempinen & Rajala, 2014). Within the system view, service innovation involves creating or improving specific service systems such as a firm's systems of hiring employees, finding sales prospects, delivering products and services, performing corporate planning, or providing customer services (Rubalcaba, 2022). Service innovation also applies to systems that cut across organisations such as supply chains (Perano et al., 2018).

Lusch and Nambisan (2015) define service system innovation as the process of re-bundling of resources that create novel resources that are beneficial to some actors in a given context. It is a mix of technological innovation, business model innovation, socio-organisational advancement, and market innovation to improve current or develop new service value offerings (offerings or experiences) and service systems (Campbell & Park, 2016). In addition, service system innovation refers to the enhancement of service systems.

Service system innovation dimensions include idea development, service development, and commercialization (Doroodian et al., 2014). Idea generation as a dimension of service system innovation supports the achievement of organisational goals by providing potentially useful ideas aimed at solving service problems or providing ways to explore new opportunities (Alexe et al., 2014). Moreover, without new ideas, an organization stagnates, abates, and finally is ousted by competitors who have novel and better ideas (Khaled & Hadia, 2014; Salunke et al., 2019). Again, service development has been a hot issue in the innovation literature. This reflects the rapidly increasing contribution of service development to the wellbeing of service firms and the economy in general (Weerawardena & McColl-Kennedy, 2002). A growing number of scholars believe that service development gives organizations a competitive edge over their contemporaries (Weerawardena & McColl-Kennedy, 2002). The third dimension of service system innovation is commercialization otherwise known as marketing ability and emphasizes the improvement of relationship with customers, leveraging technology and marketing, reading markets to pursue innovation, getting market-oriented vision and value (S. U. Ha, 2010). Therefore, service firms make use of their commercialization capability to create cordial relationships with their actual and potential customers, therefore ensuring superior performance and customer satisfaction (Rahimli, 2012). Commercialization represents the capacity to commercialize innovation and the ability to industrialize innovation (creating customer-oriented service). Thus, commercialization capability is critical for telecommunication firms (Neslihan & Hüseyin, 2012).

2.2. Firm Competitiveness (FC)

Competitiveness can be viewed from three levels. That is, organisational or firm competitiveness (FC), national competitiveness, and international competitiveness (Akhuand & Abbas, 2021; Jegede et al., 2012). Although this work focused on FC, the other two—national and international competitiveness are briefly discussed before paying full attention on firm-level competitiveness.

National competitiveness is a multifaceted, sophisticated idea that Michael Porter popularized with his Diamond Model (national competitive advantage theory). National competitiveness shows a national economy's favourable position, particularly in the area of international business, and its capacity to maintain and improve this position (Porter et al., 2000). The idea of national competitiveness looks at a country's capacity for economic expansion and is determined by a number of variables, regulations, and institutional frameworks that define a nation's degree of production (Ai & Ushakov, 2019). National competitiveness refers to a nation's capacity to maintain and grow its market share on the global stage while also enhancing the standard of living for its citizens. It approximates a nation's capacity to develop and compete with other nations for investments, human capital, and other resources. National competitiveness is measured using frameworks developed by the Global Competitiveness Reports, World Competitiveness Yearbooks, and National Competitiveness Reports.

Also, national competitiveness reflects the ability of a State to maintain constant real wage increases, promote local businesses on the global market through high-performance clusters, and produce goods and services of higher quality that support the development of future jobs (Annict et al., 2020). National competitiveness is dependent on a number of factors, such as volume of investments, the capacity for innovation, the presence of manufacturing facilities, and others (Hakhverdyan & Shahinyan, 2022). However, in order for the national economy to function well in the global market, their performance must be paired with political and social factors (Annict et al., 2020). Once more, national competitiveness is a reflection of the economic, scientific, technological, organisational, managerial, marketing, and other capabilities that are applied to goods and services and successfully ensure their competition against foreign goods and services at the domestic and international markets (Kharlamova & Vertelieva, 2013).

On the other hand, international competitiveness measures the relative cost and value of a country's exports (Pettinger, 2017). Likewise, international competitiveness is the degree to which a nation can, under free and fair market conditions, produce goods and services that meet the test of international markets while simultaneously maintaining or expanding the real incomes of its citizens (Johnson, 2015). Many factors influence international competitiveness including project price, export financing, technological and management capabilities, joint ventures, and multilateral development bank financing (Johnson, 2015; Mathis, 2011). Additionally, the World Economic Forum (2014) defined international competitiveness as the set of institutions, policies, and factors that determine the level of productivity of a country and further stated that several factors are responsible for international competition including institutions, business sophistication, market size, innovation, financial market development, infrastructure, and innovation.

Firm competitiveness is very important in today's volatile business environment especially for organizations striving to achieve competitive edge in order to remain relevant (Nguyen et al., 2021). Organisational competitiveness is a firm's capacity to produce and deliver high-quality goods and services at a low cost (Obuba & Alagah, 2022; Ying et al., 2019). Obuba and Alagah (2022) define competitiveness as the outcome of firms' successful strategy implementation. It can be obtained by offering superior value to the customer through either unique benefits that offset a higher or lower price than competitors for equivalent benefits. On their part, Anik et al. (2010) sees competitiveness as the ability of company to meet the needs of customers and satisfy them, as well as to meet the needs of employees in the company, and to achieve a higher return on investment for growth, in addition to developing and reaching its goals and objectives. Similarly, Agha et al. (2011) define competitiveness as a company's ability to produce products or services

providing higher value compared to their rival products or services. This results in higher sales and maximized profits. Naliaka and Namusonge (2015) assert that competitiveness is the most appropriate tool for discovering new, creative, and innovative ways to produce and deliver goods and services more effectively than rivals in the market. Competitive strategy is usually developed around many characteristics such as product quality, technology and innovation, reliability, brand image, firm reputation, durability, and customer service, which must be difficult for rivals to imitate (Moses, 2010; Ying et al., 2019). Hence, competitiveness at the firm level can be described as the firm's ability to thrive in a competitive environment with its rivals. Companies from all over the world gain a competitive edge over their rivals notwithstanding the pressure and challenge. The existence of strong local rivals, aggressive local suppliers, and demanding customers perpetuate the competitiveness of companies meeting them with the help of innovation.

Firm's competitive advantage as compared to other competitors in the market stems from different business processes like production, R&D, financing, and marketing. Currently, production of high-quality goods is not the core issue. What has been reported to be lacking among most less competitive firms is the delivery part of the product or the service to the target market in order to meet customer satisfaction (Kotler & Armstrong, 2013). Kotler and Keller (2012) contended that a firm should be comparatively effective with its competitors in the creation, delivery, and communication of customer value to the target market.

2.3. Hypotheses development

2.3.1. Idea development and firm competitiveness

Achieving competitive edge is a top priority for administrators and leaders of organizations (Feizi, 2019; Ofoegbu & Onuoha, 2018). In fact, every organization strives to gain a competitive advantage over its rivals. The capacity of an organization to develop creative ideas that result in unique services and products determines how competitive it can be (Chesula & Kilika, 2020). These days, due to the hyper-competitive nature of the business operating environment, businesses are looking beyond management to create ideas, businesses increase their possibility of generating smart ideas by paying more attention to every employee who may have intelligent ideas. Thus, idea generation and development is the ground on which firm competitiveness strives, specifically in the telecommunication sector which is characterized by frequently changing customer needs and aspirations (Chesula & Kilika, 2020; Meena & Geng, 2022). The competition in the telecommunication industry is caused by the struggle among key players to render more efficient and economical services (Baruah et al., 2015; Meena & Geng, 2022). All telecommunication firms in the country including Globacom, MTN, 9Mobile and Airtel are developing strategies to attract more subscribers and lead the market. To succeed in the telecommunication sector, Chesula and Kilika (2020) advise telecommunication firms to continuously improve services through the generation of new ideas. Several studies uphold that idea development is central to the achievement of competitive advantage (Alexe et al., 2014; Chesula & Kilika, 2020; Roberts & Amit, 2003). Specifically, Roberts and Amit (2003) investigated the effect of innovative activities such as idea management and service development on competitive advantage in the Australian banking sector and found that idea management contributes positively to competitiveness of the banking sector. Thus, we hypothesize that:

H₁: Idea development has a significant effect on firm competitiveness.

2.4. Service development and firm competitiveness

Recent years have witnessed unprecedented growth in the telecommunication sector. The growth in the telecommunication sector has been attributed to the continuous improvement in the services rendered by the telecommunication firms (Grabowska & Saniuk, 2022; Weerawardena & McColl-Kennedy, 2002). This has resulted in a tremendous interest in new service development and its significance to firm competitiveness, reflecting the rapidly increasing contribution of new

services development to the organizations. A growing number of researchers suggest that service development leads to service firm competitive advantage (Weerawardena & McColl-Kennedy, 2002). Grabowska and Saniuk (2022) noted that organizations develop new or modified their services with the intention of achieving competitive edge and effectiveness in their operations. Further, Grabowska (2016) asserts that organizations that wants to be successful in the market have to build a competitive open business model that will distinguish it from its competitors and the condition for achieving a competitive advantage is the efficiency of operation through improved services (Schneider & Spieth, 2013; Teece, 2010). Besides, Roberts and Amit (2003) found that service development positively and significantly influences competitive advantage of commercial banks in Australia, which agrees with the finding of Weerawardena and McColl-Kennedy (2002) that new service development propels competitive advantage. Hence, we propose that:

H₂: Service development has a significant effect on firm competitiveness.

2.5. Commercialization and firm competitiveness

Success of service organizations operating in a dynamic environment relies mostly on their ability to commercialize their products or services (Rahimli, 2012), therefore Commercialization capability is critical for firms in competitive intensive markets because organizations cannot get their products and services to the end users without commercialization capability (Neslihan & Hüseyin, 2012; Seo et al., 2015). Likewise, commercialization has been stressed to positively affect performances of firms (Lee & Chung, 2010). Service firms make use of their commercialization capability to create cordial relationships with their actual and potential customers, therefore ensuring superior performance and customer satisfaction (Rahimli, 2012). Several studies have found positive correlations between commercialization and competitiveness (Friedrichsen, Zarea, Tayebi, & Abad, 2017). In addition, Seo et al. (2015) assert that Korean SMEs with high commercialization capability continuously out-compete their contemporaries. Hence, we hypothesize that:

H₃: Commercialization has a significant effect on firm competitiveness.

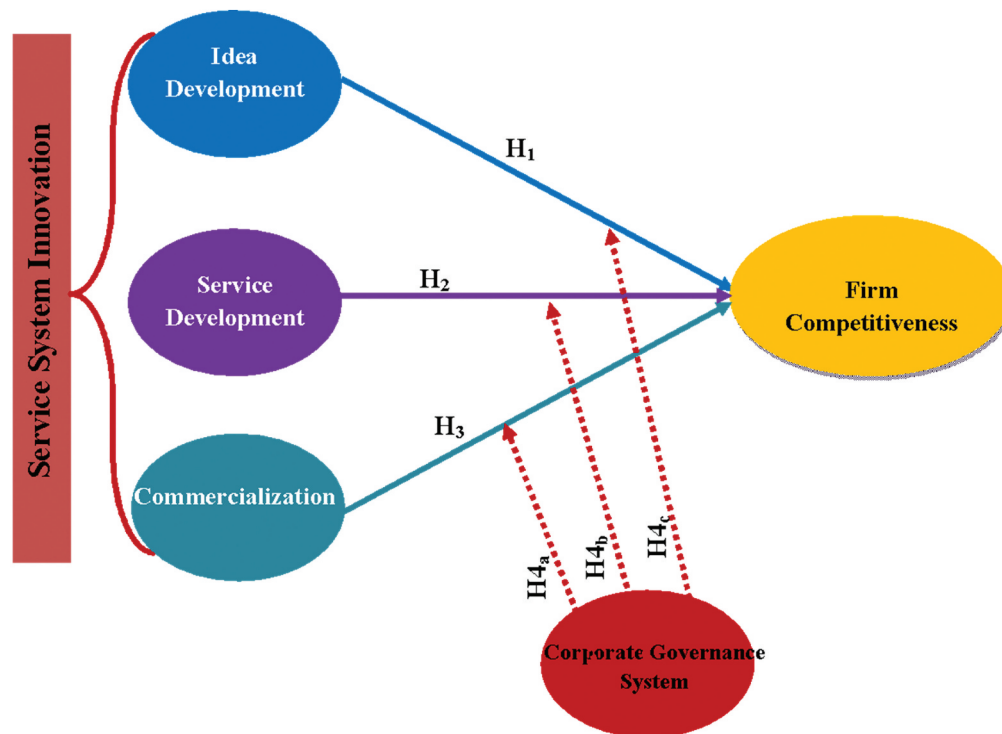
2.6. Moderating role of corporate governance system on service system innovation and firm competitiveness

Service system innovation contributes significantly to the competitiveness of modern organizations, especially in the service sector (Tovar & Figueroa, 2020). Competitiveness is achieved through the generation of novel ideas; transforming those ideas into improved services; and getting the new services to market, therefore higher level of competitiveness is as a result of service system innovation (Doroodian et al., 2014). However, the corporate governance system (CGS) plays a significant role in the achievement of service system innovation because the organization relies on its ownership structure and board of directors to formulate innovation and competitive strategies (Akpan, Al-Faryan, et al., 2022; Katarzyna & Zdzisława, 2014).

Corporate governance has evolved from accountability and compliance with laws and regulations to a focus on the development of competitive business strategies to help the firm's competitive efforts (Nginyo et al., 2018). In actuality, corporate governance plays a key role in determining how well a company performs and, ultimately, how well it achieves competitive advantages and increases the level of innovation of a firm (Barney, 2014; Nginyo et al., 2018). Therefore, it is arguably true that effective corporate governance system acts as a tool for achieving firm innovation and competitive advantage. Therefore, we proposed that:

H_{4a-c}: CGS significantly moderates the correlation between SSI (idea development, service development, and commercialization) and FC.

Figure 1. Conceptual Framework, 2022.



The research model in Figure 1 shows the link between service system innovation (idea development, service development, and commercialization) and firm competitiveness as well as the moderating effect of the corporate governance system on the relationship between SSI and FC.

3. Methodology

3.1. Research design and data collection

This study adopted a cross-sectional design. This is because the survey took place at one point in time giving a snapshot of the participant responses (Lau, 2017). Also, cross-sectional design was adopted because the study explored the relationships between proxies of service system innovation and firm competitiveness (Onwuegbuzie & Collins, 2007). The respondents for this study were drawn from senior members of staff and customer service employees of nine (9) telecommunication firms in Nigeria. Senior members of staff of the telecommunication firms were selected because they occupy decision-making positions and contribute in formulation and implementation of innovation and competitive strategies, while customer service personnel were chosen since they have first-hand feedbacks from customers and other stakeholders, hence have the knowledge of how effective the firm's strategies are. Four (4) of the firms are on the global system for mobile communication, while the remaining five (5) are data and internet service providers. The survey instrument (please see appendix) was sent to 450 respondents using hand delivery and Google form. However, 230 copies were filled and returned. This represented a 51.1% return rate that satisfied the acceptable return rate for a cross-sectional study (Fincham, 2008).

3.2. Operational measures of variables

The independent variable for this study is service system innovation. It was decomposed into idea development, service development, and commercialization. These dimensions were adopted from the service innovation capacity instrument by Mahmood et al. (2014) and are measured using 18 statement items. Idea development was measured using five items such as "We develop both formal and informal methods of generating innovative service ideas". Service development was measured using seven items including "New services initiatives are encouraged and applauded".

Commercialization latent variable has six indicators, such as “We frequently conduct market analysis to know changes in customers’ needs”. The items for idea development and service development were adapted from Froehle and Roth (2007), while items for commercialization were adopted from Mahmood et al. (2014).

The dependent variable in this study is firm competitiveness. It was observed as a mono-dimensional construct and measured with eight (8) statement items such as “Our cost of service is low in comparison to our competitors; we offer services that are highly reliable”, adopted from Sachitra (2016), and Ismail (2013). Finally, a short version instrument was adopted to measure the moderating variable—corporate governance system. The scale comprised seven (7) items such as “The board sets clear organisational priority on innovative activities for the year ahead; the governing board members of my firm actively provide insight, advice, and support on key decisions”. These items were adapted from Molokwu et al. (2013), and Olori and Sylva (2017). The statement items were modified to fit the telecommunication firms, and anchored on a five-point Likert scale.

4. Results and discussion

4.1. Descriptive statistics

Table 1 below shows the demographic details of the respondents. The gender characteristic showed that there are more female respondents. There are 124 female and 106 male respondents which represent 53.9 and 46.1% respectively.

Marital status shows that 137(59.6%) are married, while 49(40.4%) are singles. Experience on the job shows that the majority (122) of the respondents have spent between 6 and 10 years (53.0%) with their firms, followed by 0–5 years (29.6%). Those that have worked for 11–15 years

Table 1. Analysis of demographic profiles of respondents

Variable	Item	Frequency	Percent
Gender	Male	106	46.1
	Female	124	53.9
	Total	230	100
Marital Status	Married	137	59.6
	Single	93	40.4
	Total	230	100
Age	18–35	102	44.4
	36–50	84	36.5
	51- Above	44	19.1
	Total	230	100
Years of work experience	0–5	68	29.6
	6–10	122	53.0
	11–15	33	14.3
	16–20	7	3.1
	Total	230	100
Highest level of educational attainment	0'level	5	2.2
	OND/NCE	44	19.1
	HND/B.Sc	109	47.4
	MBA/M.Sc	69	30.0
	DBA/Ph.D	3	1.3
	Total	230	100

Note: OND = Ordinary National Diploma, NCE = National Certificate of Education, HND = Higher National Diploma.
 Source: Field Data, 2022.

represented 14.3%. Lastly, 7(3.1%) of the respondents filled 16–20 years. Educational attainment indicates 2.2% with O' level, 19.1% with Ordinary Diploma or National Certificate in Education, 47.4% with Higher National Diploma or Bachelor's Degree, 30.0% have obtained Master Degree, and 1.3% have earned Doctorate. As a result, telecommunications workers are well-educated. This might be due to telecommunication companies' rapid technology adoption. As a result, only the most qualified employees are recruited (Ezenwakwelu et al., 2021).

4.2. Measurement model

The Partial Least Square—Structural Equation Modeling (PLS-SEM) was deployed in assessing the research model. Since PLS-SEM does route analysis, factor analysis, and regression analysis all at once, it is appropriate for exploratory research (Ringle et al., 2012). PLS-SEM involves two steps (Ringle et al., 2015). First, the measurement model is examined. Then the structural model is assessed. The measurement model shows the reliability and validity of the constructs using factor loadings, indicator reliability, and the Average Variance Extracted. Figure Figure 2 reveals that all items for idea development, service development, and commercialization reported acceptable levels of factor loadings above 0.70 above. Similarly, factor loadings were observed for individual indicators for firm competitiveness and corporate governance system, which scored above the recommended threshold. Thus, all the indicators were adopted for the subsequent analyses (Hulland, 1999).

The inner model depicts the structural connections between the constructs, whilst the outer model shows the correlation between the constructs and their corresponding latent variables, as could be seen in the factor loadings. Idea development (ID1-ID5), service development (SD1-SD7), and commercialization (CM1-CM6) are the components of the predictor variable (service system innovation). Firm competitiveness (COM1-COM8) is the criterion variable, whereas corporate governance system is the moderator (CGS1-CGS7).

Figure 2. Assessing the Measurement Model.

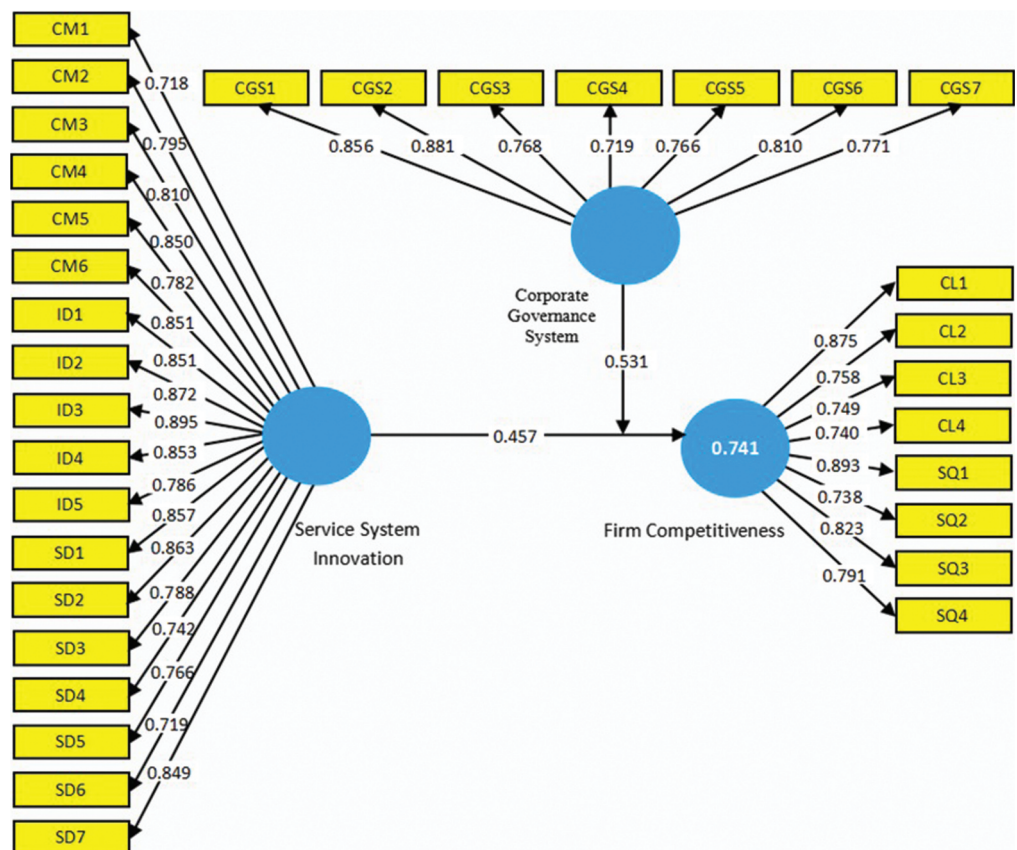


Table 2 pertains to measurements on reliability and convergent validity of the study instrument. An assessment of the Cronbach alpha and composite reliability values revealed satisfactory values. All the values were above the acceptable threshold of 0.7 (Nunnally, 1978). Also, the squared values of individual item factor loadings (indicator reliability) met the 0.50 threshold for indicator reliability. Moreover, convergent validity was ascertained using average variance extracted (AVE).

Table 2. Factor Loadings, Reliabilities, and AVEs for all the items listed in the new model

Latent Variables	Indicators	Convergent Validity			Internal Consistency/Reliability	
		Loadings	Indicator Reliability	AVE	Composite Reliability (Pc)	Cronbach Alpha (CA)
		>0.70	>0.50	>0.50	>0.70	0.70–0.90
ID	ID ₁	0.851	0.724	0.728	0.929	0.891
	ID ₂	0.872	0.760			
	ID ₃	0.895	0.801			
	ID ₄	0.853	0.728			
	ID ₅	0.786	0.618			
SD	SD ₁	0.857	0.735	0.639	0.925	0.883
	SD ₂	0.863	0.745			
	SD ₃	0.788	0.621			
	SD ₄	0.742	0.551			
	SD ₅	0.766	0.587			
	SD ₆	0.719	0.517			
	SD ₇	0.849	0.721			
CM	CM ₁	0.718	0.516	0.5643	0.915	0.859
	CM ₂	0.795	0.632			
	CM ₃	0.810	0.656			
	CM ₄	0.850	0.723			
	CM ₅	0.850	0.723			
	CM ₆	0.782	0.612			
	CM ₇	0.718	0.516			
COM	COM ₁	0.875	0.766	0.637	0.933	0.899
	COM ₂	0.758	0.575			
	COM ₃	0.749	0.561			
	COM ₄	0.740	0.548			
	COM ₅	0.893	0.797			
	COM ₆	0.738	0.545			
	COM ₇	0.823	0.677			
	COM ₈	0.791	0.626			
CGS	CGS ₁	0.856	0.733	0.636	0.924	0.882
	CGS ₂	0.881	0.776			
	CGS ₃	0.768	0.590			
	CGS ₄	0.719	0.516			
	CGS ₅	0.766	0.587			
	CGS ₆	0.810	0.656			
	CGS ₇	0.771	0.5594			

Note: ID = Idea Development, SD = Service Development, CM = Commercialization, COM = Firm Competitiveness, CGS = Corporate Governance System Source: SmartPLS 3.2.9 Output on Research Data, 2022.

An AVE value above 0.5 for each of the constructs confirmed convergent validity of the constructs (Bagozzi & Yi, 1988).

Table 3 shows the assessment of constructs' discriminant validity using the Fornell and Larcker's (1981) criterion. By comparing the correlations of the latent constructs with square roots of AVE, the discriminant validity of the latent variables was determined. The square roots of the AVEs were greater than correlations across latent components, indicating that the research instrument in this study had appropriate discriminant validity.

4.3. Structural model (test of hypotheses)

The significance of the path coefficients (β) and the coefficients of determination (R^2 or predictive accuracy) were used to test hypotheses (Geisser, 1975). The final step in structural analysis (for main effect) deployed Cohen's f^2 to calculate the effect size of each path in the model (Cohen, 1988). The effect size determines whether or not an independent latent variable has a significant influence on a dependent latent variable. Exogenous LVs with f^2 values between 0.020 and 0.150, between 0.150 and 0.350, and over 0.350 have a small, medium, or substantial influence on endogenous LVs, respectively (Cohen, 1988).

Path coefficients of .10 to 0.29, .30 to .49, and .50 to 1.0, are deemed weak, moderate, and strong correlations, respectively (Cohen, 1988). T values more than 1.96 are significant in a two-tailed test, whereas t -values less than 1.96 are non-significant (Hair et al., 2017).

The results of the test of hypotheses are shown in Figure 3, Tables 4, and 5 below:

Table 4 indicates significant paths between idea development and firm competitiveness ($\beta = 0.612$; $t = 7.225$; $p < 0.05$), service development, and firm competitiveness ($\beta = 0.400$; $t = 7.765$; $p < 0.05$), and commercialization and firm competitiveness ($\beta = 0.310$; $t = 6.462$; $p < 0.05$). Hence, stated hypotheses were supported.

Table 5 depicts the effect sizes of idea development, service development, and commercialization on firm competitiveness (endogenous constructs), with f^2 values of 0.02, 0.15, and 0.35. These values represent small, medium, and large effects, respectively (Cohen, 1988; J. F. Hair et al., 2017). It also shows the r^2 (predictive accuracy) and q^2 (predictive relevance) results.

As a rule of thumb for structural models, when Q^2 values of an endogenous construct are larger than zero (>0), it is indicative that the exogenous (explanatory) construct has predictive relevance for the endogenous construct (J. J. F. Hair et al., 2020). Table 5 shows the values of Q^2 for all endogenous constructs ranging from 0.220 (idea development) to 0.168 (commercialization). Since the Q^2 values for the endogenous constructs are greater than zero, it means the structural model is capable of predicting the endogenous latent variables indicators.

Table 3. Discriminant validity – Fornell and Larcker Criterion

	AVE	ID	SD	CM	MC	COM
ID	0.726	0.852				
SD	0.639	0.275	0.799			
CM	0.643	0.360	0.422	0.802		
COM	0.637	0.418	0.334	0.235	0.798	
CGS	0.636	0.515	0.518	0.392	0.483	0.797

Note: ID = Idea Development, SD = Service Development, CM = Commercialization, COM = Firm Competitiveness, CGS = Corporate Governance System. The off-diagonal values are the correlations between latent variables, while the diagonal values (in bold) denote the square root of AVEs. Source: SmartPLS 3.2.9 output on Research Data, 2022.

Figure 3. Path coefficient of latent variables (main effects) ID, SD, CM and COM.

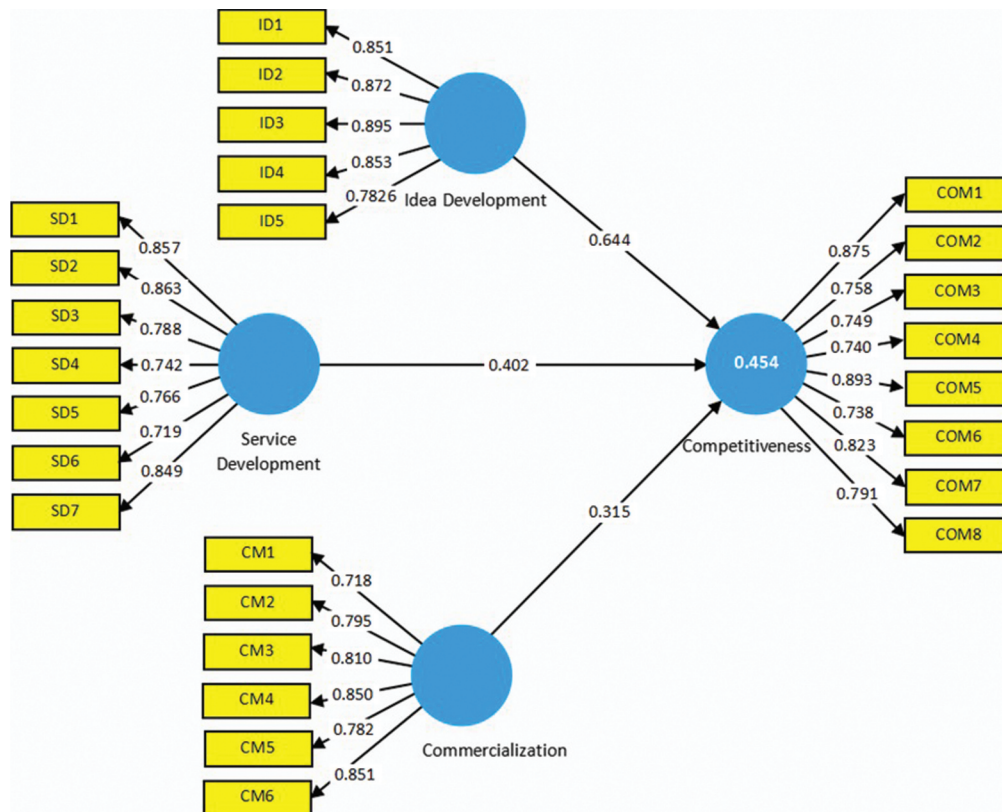


Table 4. Results of hypotheses testing

Hypotheses	Path coefficient	Standard error	T. value	P. value	Decision
ID -> COM	0.644	0.071	7.232	0.001	Supported
SD -> COM	0.402	0.046	7.546	0.001	Supported
CM -> COM	0.315	0.054	6.622	0.000	Supported

Note: ID = Idea Development, SD = Service Development, CM = Commercialization, CGS = Corporate Governance System, COM = Firm Competitiveness. T-Statistics greater than 1.96 at 0.05 levels of significance. Source: SmartPLS 3.2.9 Output on Research Data, 2022.

Table 5. Predictive Accuracy, Predictive Relevance, and Effect sizes (f^2)

Paths	Correlation coefficient (r)	Predictive Accuracy r^2	Adjusted r^2	Effect Size f^2	Predictive Relevance Q^2
ID -> COM	0.644	0.415	0.410	0.19 Medium	0.220
SD -> COM	0.402	0.162	0.159	0.35 Large	0.198
CM -> COM	0.315	0.099	0.097	0.16 Medium	0.168

Note: ID = Idea Development, SD = Service Development, CM = Commercialization, CGS = Corporate Governance System, COM = Firm Competitiveness. r^2 , 0.19 = weak; r^2 , 0.33 = moderate; r^2 , 0.67 = substantial, Chin (1988). Effect size (f^2) of 0.02 = small; 0.15 = medium, while 0.35 = large effect. $Q^2 > 0$ = satisfactory predictive relevance, J. F. Hair et al. (2014).

Source: SmartPLS 3.2.9 Output on Research Data, 2022.

Also, the r^2 (predictive accuracy) shows that moderate predictive accuracy of idea development on firm competitiveness. However, service development and commercialization returned weak

predictive accuracy on firm competitiveness. Thus, it could be interpreted that the idea development leads to higher variation in firm competitiveness. That is, an increase in idea development suggest a corresponding increase in unit of firm competitiveness.

Finally, the f^2 (effect sizes) results show that, service development has the largest effect on firm competitiveness of the telecommunication firms with an f^2 value of 0.35. Idea development has a moderate effect on competitiveness with a value of 0.19, while commercialization has the least but moderate effect on firm competitiveness with an f^2 value of 0.16.

Figure 4. Test of Hypothesis Four.

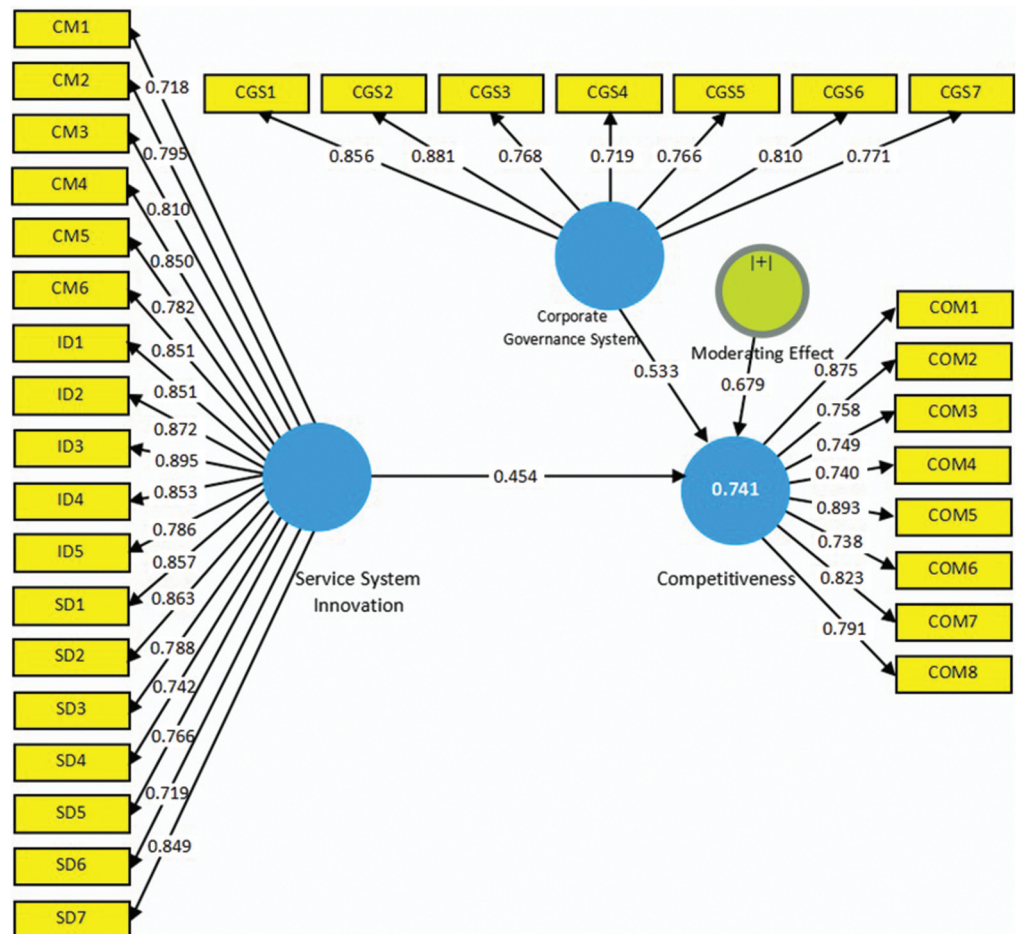


Table 6. Moderating Effect of Corporate Governance System

Paths	B	t-values	P. Values	Decision
SSI -> COM	.454	8.755	.000	Supported
CGS -> COM	.533	10.455	.002	Supported
Mod. Eff. 1 -> COM	.679	13.541	.000	Supported

Note: SSI = Service System Innovation, CGS = Corporate Governance System, COM = Firm Competitiveness. T-Statistics greater than 1.96 at .05 level of significance.

Source: SmartPLS 3.2.9 Output on Research Data, 2022.

4.4. Test of hypothesis four

Figure 4 and Table 6 show the moderating effect of the corporate governance system on the relationship between service system innovation and firm competitiveness. Based on the guidelines of J. F. Hair et al. (2017), the moderating variable corporate governance system was linked structurally to the dependent variable, firm competitiveness. An observation of Table 6 shows a positive significant relationship service system innovation and firm competitiveness ($\beta = 0.457$, $t = 8.625$, $p\text{-value} < .05$). However, the introduction of the corporate governance system “the moderating effect 1 \rightarrow Comp”, boosted the relationship ($\beta = 0.662$, $t = 11.241$, $p < .05$). Hence, the hypothesis that the corporate governance system significantly moderates the relationship between service system innovation and firm competitiveness was accepted.

4.5. Discussions

The study concentrated on determining the effect of service system innovation (SSI) on firm competitiveness (FC) of telecommunication firms in Nigeria, an emerging economy. Further, the study assessed the moderating influence of the corporate governance system on the correlation between SSI and FC. Data were collected from managers and customer service attendants of telecommunication service providers. The validity, reliability, and suitability of data were first confirmed before the study's hypotheses were tested using PLS-SEM via SmartPLS 3.2.9 software. Hypothesis one stated that idea development has significant effect on firm competitiveness, the result showed that idea development has a positive and significant effect on firm competitiveness of the telecommunication firms. This result implies that the more new and innovative ideas are generated the higher the level of competitiveness of the telecommunication firms. This result is consistent with the views of Littunen et al. (2021) that innovative ideas promote competitiveness of enterprises in Finland. Similarly, the result supports the submission of Alexe et al. (2014) that idea development is important in the achievement of organisational goals through the provision of useful ideas, solving service problems, and opening new opportunities; thus, ensuring the achievement of competitive edge. Further, Khaled and Hadia (2014) asserted that without new ideas, an organisation stagnates, abates and finally is ousted by competitors who have novel and better ideas. Also, in this study of Weerawardena and McColl-Kennedy (2002), it was established that the provision of novel and improved services gives organisations competitive advantage. In addition, Nuryakin and Maryati (2022) found that green innovation is essential for competitive advantage among small and medium businesses in Indonesia.

The second hypothesis stated that service development significantly influences firm competitiveness. The analysis shows that service development has significant and positive influence on firm competitiveness of the telecommunication firms. The finding agrees with the study of Grabowska and Saniuk (2022) who found that new service development contributes significantly to firm competitiveness. Likewise, Weerawardena and McColl-Kennedy (2002) found that the growth in the telecommunication sector can be attributed to the continuous improvement in the services rendered by the telecommunication firms. Further, Roberts and Amit (2003) found that service development positively and significantly influences competitive advantage of commercial banks in Australia.

The third hypothesis that commercialisation has a significant effect on firm competitiveness was supported. The result is tandem with the submission of Seo et al. (2015) that commercialization capability is critical for firms operating in competitive and intensive markets such as the telecommunication markets. Similarly, Neslihan and Hüseyin (2012) stated that commercialization capability helps get products and services to the final consumers. Correspondingly, Rahimli (2012) submitted that service firms use commercialization capability to create cordial relationships with their actual and potential customers, therefore ensuring superior performance and customer satisfaction. The finding further agrees with the postulation of Seo et al. (2015) that Korean SMEs with high commercialization capability continuously out-compete their contemporaries.

Hypothesis four stated that corporate governance system significantly moderates the service system innovation—firm competitiveness relationship. The result supports the hypothesis, hence corporate governance system amplifies the relationship between service system innovation and

firm competitiveness. This finding implies that corporate governance system helps telecommunication firms to achieve competitive advantages as well as boost innovation among the firms (Barney, 2014; Nginyo et al., 2018). This finding resonates with the study of T. X. Ha and Tran (2022) who found that corporate governance amplifies the impact of product market competition on the performance of Vietnamese listed firms.

5. Conclusion and recommendations

The study adopted a cross-sectional design to examine the empirical link between service system innovation and firm competitiveness with a focus on telecommunication firms. Also the moderating role of the corporate governance system on the correlation between service system innovation and firm competitiveness was considered. The results proved that service system innovation via its dimensions of idea development, service development, and commercialization influenced the competitiveness of the telecommunication firms. Likewise, the study confirmed that corporate governance system plays a significant role in the service system innovation—firm competitiveness relationship. The study concluded that an increase in idea development, service development, and commercialization is needed for an improved firm competitiveness. Likewise, the corporate governance system is strategic for service system innovation and firm competitiveness relationship.

The study emphasizes the need for telecommunication firms to put in place effective mechanisms to generate novel ideas and services as well as create markets for their services in order to harvest higher levels of competitiveness. Moreover, the study pinpoints to managers of telecommunication firms that their firms stand to gain more competitive edge provided they adopt an effective corporate governance system alongside service system innovation. Furthermore, the study recommends that the telecommunication firms should adopt several sources of generating novel ideas and utilize such ideas to develop quality services. In addition, the telecommunication firms should encourage employees to suggest new ways of satisfying their customers while conducting frequent market analysis in order to know the expectations of the customers and devise innovative means of satisfying these needs. Also, the study advocated that telecommunication firms need to develop appropriate corporate governance systems through board involvement in creating innovative ideas, services, and commercialization strategies.

5.1. Managerial and practical implications

The study charted a new path in research by exploring the moderating influence of corporate governance system on service system innovation and firm competitiveness from an emerging market perspective which was unexplored before now. In addition, the study advances the importance of the corporate governance system in the competitiveness of telecommunication firms in emerging economies. The study has managerial implications that in the context of telecommunication firms in emerging markets, the firms need service system innovation to withstand the competitive nature of the industry. Additionally, they require an effective corporate governance system to achieve service system innovation as well as improve firm competitiveness.

Practically, the study provides evidence on the characteristics of service system innovation, corporate governance system, and firm competitiveness within the context of the telecommunication industry. In addition, the study developed and validated an instrument for measuring service system innovation, firm competitiveness, and corporate governance system within a developing economy which may be adopted by future studies when examining these variables. Furthermore, the study extends the theory of dynamic capabilities theory in firm competitiveness literature.

Methodologically, the study introduces corporate governance system as a moderator between service system innovation and firm competitiveness. Review of literature shows that despite corporate governance playing significant role in the level of innovation and firm competitiveness individually, it has not been used as a moderator between innovation and competitiveness. Although corporate governance has been adopted as a moderator among several organizational variables such as social capital and competitiveness, product market competition and firm

performance, and organizational resources and performance. This study made methodological contribution by developing a model to measure the moderating role of corporate governance system in the relationship between service system innovation and firm competitiveness.

5.2. Limitations and suggestions for further studies

There are some limitations to this study, despite the fact that it has enormous implications to the management literature. First, while the study could only use a survey design, future research may use a longitudinal design to take into account the relationship between service system innovation and firm competitiveness. Next, only Nigerian telecommunication firms were included in the analysis. Therefore, companies from other industries, like banking and energy services, should be included in future studies. The investigation was also restricted to a quantitative approach. Therefore, future research could include both the quantitative and the qualitative perspectives using a mixed method.

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Appendix

Section A

Personal Data:

(1) Name of organisation

(2) Gender: Male Female

(3) Age: 20-35 Years 36-50 Years 51 Years and above

(4) Marital status: Single Married

(5) Educational Qualification: WAEC-OND HND/B.Sc M.Sc. and above

(6) Position in the organisation

(7) Work Experience 0-10 Yrs 11-20 Yrs 21- 30 Yrs 31-50 Years
51 Years and above

Section B

Service System Innovation (SSI) Construct

This questionnaire is desired to gather information on the level of service system innovation in your firm. Kindly, indicate the extent to which you agree or disagree that the statement reflects the situation in your organisation.

(5 = Strongly agree, 4 = Agree, 3 = Undecided, 2 = Disagree, 1 = Strongly disagree)

Section C

Firm Competitiveness (Com) Construct

Please tick one choice for each of the following statements as it is applicable to your organization.

(5 = Strongly agree, 4 = Agree, 3 = Undecided, 2 = Disagree, 1 = Strongly disagree)

Section D

Corporate Governance System (CGS) Construct

Please tick one choice for each of the following statements as it is applicable to your organization.

(1 = strongly disagree, 2 = disagree, 3 = nor disagree nor agree, 4 =agree, 5 = strongly agree)

Service System Innovation						
S/N	Idea Development	1	2	3	4	5
1	We cultivate and utilize a variety of sources for new ideas					
2	We develop both formal and informal methods of generating innovative service ideas					
3	We develop both formal and informal methods of evaluating new service ideas					
4	We establish and maintain good communication with suppliers, partners, and customers as potential sources of new ideas and enhanced market insight					
5	We encourage the sharing of ideas and knowledge across functional boundaries within the organization					
	Service Development	1	2	3	4	5
1	We actively consider ideas and suggestions from employees for new service and improvements of old services					
2	New services initiatives are encouraged and applauded					
3	Our staff members are motivated to support the firm's new service development efforts					
4	Our functional areas or departments are involved in developing new services					
5	The IT systems used by those developing new services are compatible and reliable					
6	We maintain back-office and administrative IT systems that support the firm's new service development efforts					
7	Our employees are able to work effectively in cross-functional teams to design new services					
	Commercialization					
1	We frequently conduct market analysis to know changes in customers' needs					
2	We adopt innovative means to deliver our services to our customers					
3	We strongly adhere to our commercialization schedule and commitment to formal post-launch reviews					
4	We use joint venturing and other novel marketing methods to commercialize our innovations					
5	We effectively monitoring our environment to know the trending marketing strategies					
6	Our delivery time is dependable					

	Firm Competitiveness	1	2	3	4	5
1	Our subscription charges are low in comparison to our competitors					
2	Our service charges are comparatively lower than our rivals					
3	Our total service cost has reduced over the past three years					
4	Our firm has the ability to compete against the major competitors based on low prices.					
5	Our firm complete services are based on quality specified					
6	We offer services that are highly reliable					
7	We offer services that are very durable					
8	We offer high quality products to customers					

	Corporate Governance System	1	2	3	4	5
1	The board is usually involved with top management in determining development systems that encourage initiatives and creativity amongst employees					
2	The board is usually involved with strategic innovative decisions with top management.					
3	The board of directors often discusses and initiates where the organisation should be headed in three years or more on technological, product-market or administrative innovation					
4	The board sets clear organisational priority on innovative activities for the year ahead					
5	The Governing Board members of my firm are always attuned to the concerns of a variety of stakeholders					
6	The Governing Board members of my firm actively provide insight, advice and support on key decisions.					
7	The Governing Board members of my firm usually debate strategic decisions openly and constructively during meetings.					